February 1965

Brief 65-10016

NASA TECH BRIEF

Adhesive for Vacuum Environments Resists Shock and Vibration

The problem: Providing an adhesive that will withstand severe shock and vibration in high-vacuum environments. The adhesive, to be used for bonding electronic components to heat-dissipating structures, must have a high electrical resistance, a higher heat conductivity than commercial adhesives, and a thermal expansion coefficient intermediate between the coefficients of the metals comprising the objects to be bonded.

The solution: An adhesive prepared from a mixture of polyamide and epoxy resins and fine silica powder or glass microballoons.

How it's done: A low molecular weight polyamide (prepared by copolymerizing an amine and polyester resin) is mixed with an epoxy resin and fine silica powder or glass microballoons. An excess of the polyamide curing agent improves the flexibility as well as the shock and vibration resistance of the adhesive. The solid particles minimize catalyst "hot spots" and reduce shrinkage of the uncured resin and improve the heat-transfer characteristics of the adhesive.

The mixture is applied to the surface to be bonded and the assembly is heated for 24 hours at 25° C to effect curing. The results of tests show that the adhesive meets the specified requirements and retains good adhesive qualities even when used on surfaces deliberately contaminated with hydrocarbon and silicone oils.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1537
Houston, Texas, 77001
Reference: B65-10016

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA Headquarters, Washington, D.C., 20546.

Source: Westinghouse Electric Corporation, under contract to Manned Spacecraft Center (MSC-56)

Category No. 03